BREVIORA

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SHEAROGOVEA, A NEW GENUS OF CYPHOPHTHALMI (ARACHNIDA, OPILIONES) OF UNCERTAIN POSITION FROM OAXACAN CAVES, MEXICO

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ABSTRACT. *Shearogovea* gen. nov. is erected for *Neogovea mexasca* Shear, 1977, a troglobitic cyphophthalmid species from a cave system in Oaxaca, Mexico. The new genus does not show affinity to *Neogovea* Hinton, 1938, as it lacks the characteristic toothed claw of leg II or the fusion of the coxae of legs II to those of legs III (which are in turn fused to coxae of legs IV). *Shearogovea* gen. nov. is probably not related to other Neotropical neogoveid genera, but its exact phylogenetic position remains unresolved.

KEY WORDS: troglobite; Mexico; new genus; Neogoveidae; Sironidae

INTRODUCTION

Shear (1977) reviewed the Neotropical genus *Neogovea* Hinton, 1938 and described two new species, *N. kamakusa* Shear, 1977 from Guyana, and *N. mexasca* Shear, 1977 from a cave in Oaxaca, Mexico. Additional information on the latter species, originally described for two female individuals, was provided in a later paper based on a larger collection of specimens, including males, from a nearby cave (Shear, 1980). In the same paper, a new familial system was established for Cyphophthalmi, and Neogoveidae Shear, 1980 was designated for the genera *Metagovea* Rosas Costa, 1950, *Parogovia* Hansen, 1921 [misspelled as *Paragovia*] and *Neogovea*, including *N. mexasca*, despite acknowledging that it lacks characters used to diagnose the neogoveid genera (Shear, 1979).

The Mexican species differs from its supposed South American counterparts in several characters, also shared with the African *Parogovia*, later used to rediagnose Neogoveidae (Giribet, 2007b). Thus *N. mexasca* was considered of uncertain phylogenetic position in several studies (Giribet and Boyer, 2002; Schwendinger *et al.*, 2004; Giribet and Kury, 2007; DaSilva *et al.*, 2010)

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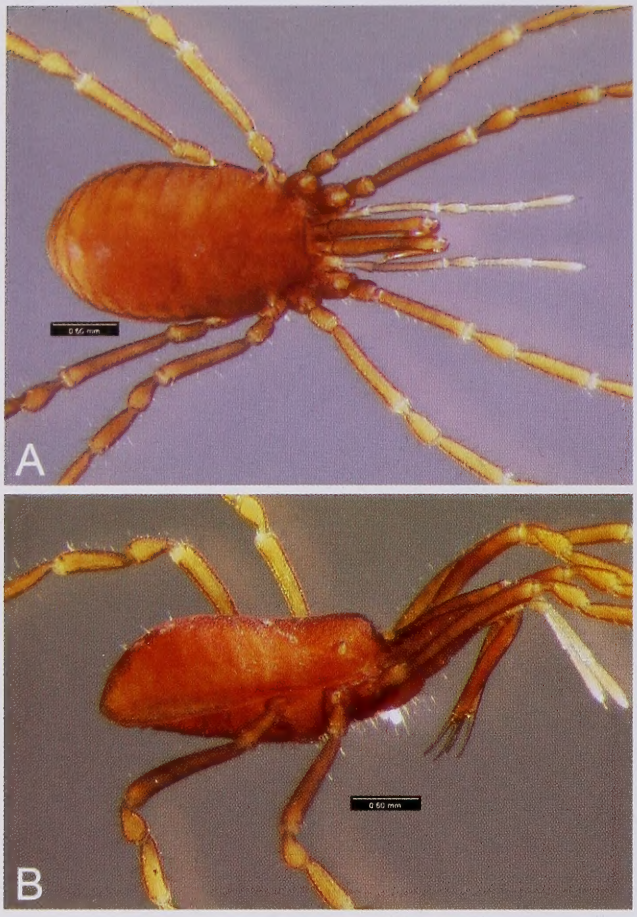

Figure 1. *Shearogovea mexasca* (Shear, 1977), female holotype, American Museum of Natural History. A, dorsal view; B, ventral view.

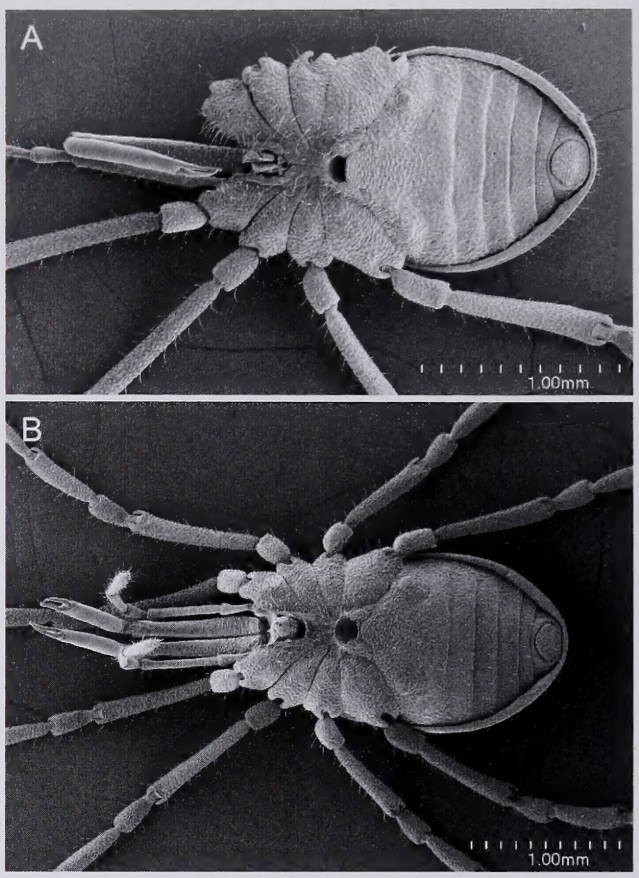

Figure 2. *Shearogovea* cf. *mexasca* from Cueva de la Finca. A, male, ventral view; B, female, ventral view.

and recently excluded from Neogoveidae (Benavides and Giribet, 2007). However, some of these characters were considered adaptations to troglobite lifestyle, and was thus considered to be an aberrant neogoveid (Shear, 1979). Here, *Shearogovea* gen. nov. is erected for *N. mexasca* Shear, 1977 on the basis of detailed morphological analysis using scanning electron microscopy (SEM), but its familial assignment remains uncertain given the currently available data.

MATERIALS AND METHODS

The material used in this study belongs to the collection of the American Museum of Natural History and the Museum of Comparative Zoology. The holotype specimen was photographed using a JVC KY- F70B digital camera mounted on a Leica MZ 12.5 stereomicroscope. A series of images (about 10) were taken at different focal planes and assembled with the dedicated software package Auto-Montage Pro Version 5.00.0271 (Syncroscopy, Frederick, MD, USA). Scanning electron micrographs were taken with a Hitachi S4700 FE-SEM, after sputter coating with gold/palladium.

Shearogovea Giribet, gen. nov.
Figures 1–4

Neogovea, *Partim.* Shear, 1977:172–175, figs. 16–24; Morales Soto, 1980:36–37; Shear, 1980:15–17, figs. 21–25; Cokendolpher and Lee, 1993:5; Rambla and Juberthie, 1994:217; Kury and Cokendolpher, 2000: 150–151; Giribet, 2000:71; Giribet and Boyer, 2002:110–116, 118, 121, 127–128;

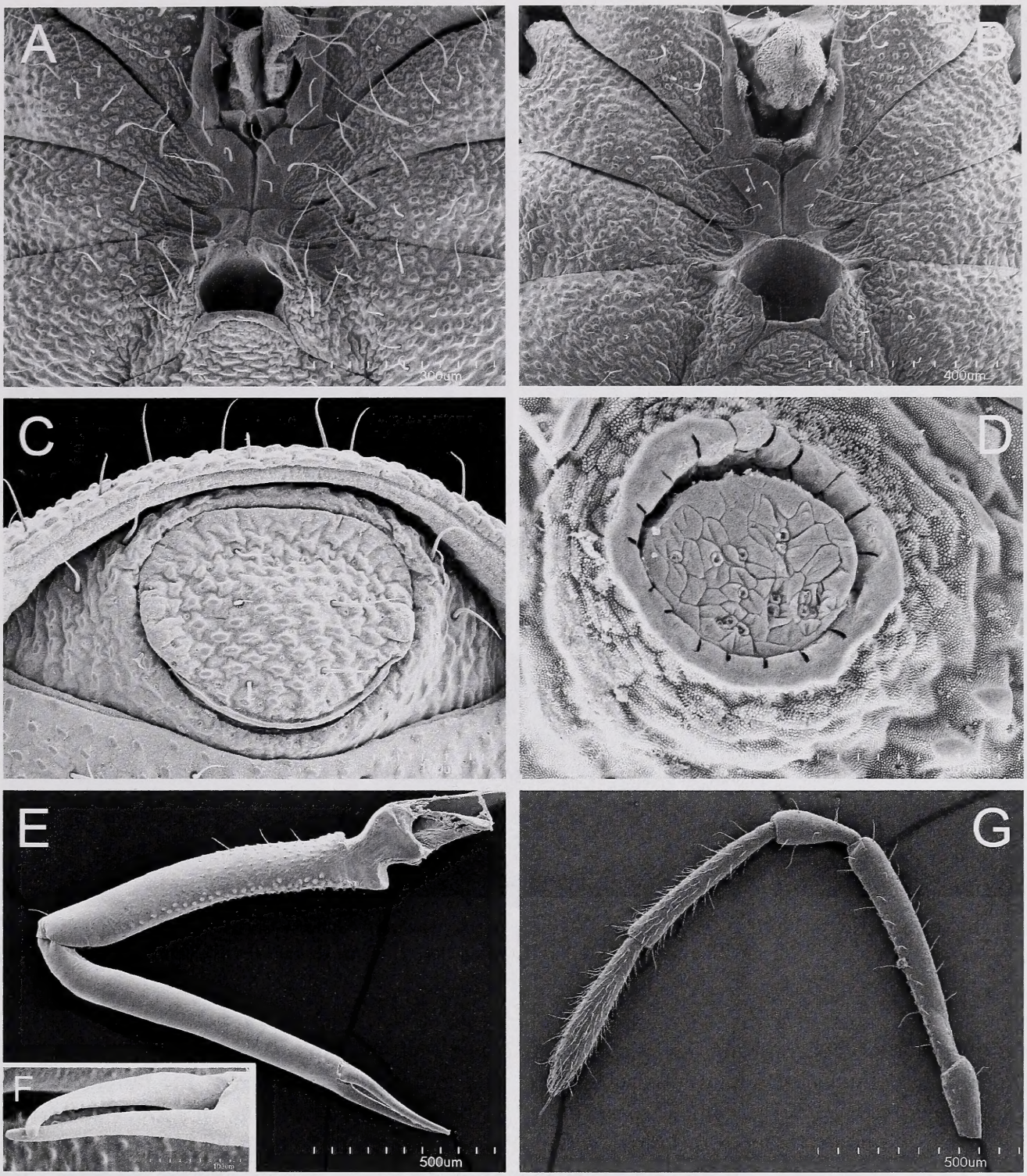

Figure 3. *Shearogovea* cf. *mexasca* from Cueva de la Finca. A, prosomal sternal complex, male; B, prosomal sternal complex, female; C, anal region, male; D, spiracle; E, left chelicer, male; F, detail of cheliceral fingers, male; G, left palp, male.

Giribet, 2007a:94; Jocqué and Jocqué, 2011:49.

'Neogovea'. Schwendinger *et al.*, 2004: 1422; Benavides and Giribet, 2007:2.

"Neogovea". Giribet and Boyer, 2002:110–116, 118, 121, 127, 128; Giribet and Kury, 2007:68, 83; DaSilva *et al.*, 2010:52.

Material Studied. The type material of *N. mexasca* consists of a female holotype and a female paratype from Cueva del Nacimiento del Río San Antonio, 10 km SSW of Acatlán de Pérez Figueroa, Oaxaca, Mexico, collected 31 December 1973 by James Reddell, William Elliott, and Roy Jameson, deposited in the American Museum of Natural History (Shear, 1977). Another collection from Cueva de la Finca, 10 km SW of Acatlán de Pérez Figueroa, Oaxaca, Mexico, collected 31 December 1976 by James Reddell, David McKenzie, and Andy Grubs, also deposited in the American Museum of Natural History, includes five males and nine females. A male and a female mounted in SEM stubs have been transferred to the Museum of Comparative Zoology under accession numbers MCZ 124538 and 124539, respectively. No other collections of this or related species are known.

Diagnosis. Medium-sized cyphophthalmids with elongated appendages (Fig. 1), without eyes or eye lenses; ozophores of type 2 (*sensu* Juberthie, 1970) (Fig. 1B), entirely ornamented, with subterminal ozopore. Anterior margin of carapace concave dorsally, leaving the base of the chelicerae and the dorsal crest clearly exposed (Fig. 1A, B). Transverse prosomal sulcus inconspicuous (Fig. 1A). Transverse opisthosomal sulci present. Middorsal, longitudinal opisthosomal sulcus inconspicuous (Fig. 1A).

Coxae of leg II free, not fused to coxae of legs III (Figs. 2, 3A, B). Sternum absent (Figs. 2A, 3A). Proximal end of coxae I of males not meeting along the midline; all other coxae meeting along the midline; male gonostome semicircular, as large as the proximal ventral part of coxae of legs IV. Coxae II–III and III–IV with endites running along their suture. Anterior projections of male coxae IV endites on gonostome wall (Fig. 3A). Spiracles circular, of the closed type (Fig. 3D). Sternites 8 and 9 and tergite IX fused into a corona analis (Fig. 3C). Anal plate and anal region without conspicuous modifications or changes in ornamentation pattern. Opisthosomal exocrine glands of males absent (both sternal or anal glands). Hansen's organ absent.

Chelicerae of the protruding type (*sensu* Giribet, 2003) (Fig. 1A, B), with one dorsal and one basal process; with the basal and second cheliceral segments elongate, almost of uniform depth; first cheliceral segment ornamented at the first half, near the base, and in the ventral portion almost during its entire length; broadest part of second cheliceral segment neither near the base nor the joint with the cheliceral finger (Fig. 3E); dentition of mobile digit uniform (Fig. 3F). Palp trochanter without ventral process; first and second article of palp ornamented (Fig. 3G).

Metatarsus of all legs ornamented (Fig. 4A, D); tarsi of all legs smooth (Fig. 4A–G), without a distinct solea on leg I (Fig. 4C); claws of all legs smooth, without comblike modifications or lateral pegs (Fig. 4C–G). Tarsus IV of males not divided (Fig. 4A); Rambla's organ absent. Adenostyle conspicuous, thin, of the lamellar type (Fig. 4B); located in the first quarter of the tarsal length, but not in a basal position (Fig. 4A).

Spermatopositor with short ventral plate and without ventral microtrichiae, lacking moveable fingers (see Shear, 1980, figs. 24–25). Ovipositor typical, with terminal sense organs (Shear, 1977:174–175).

Included Species. Shearogovea mexasca (Shear, 1977) is the type and only species in

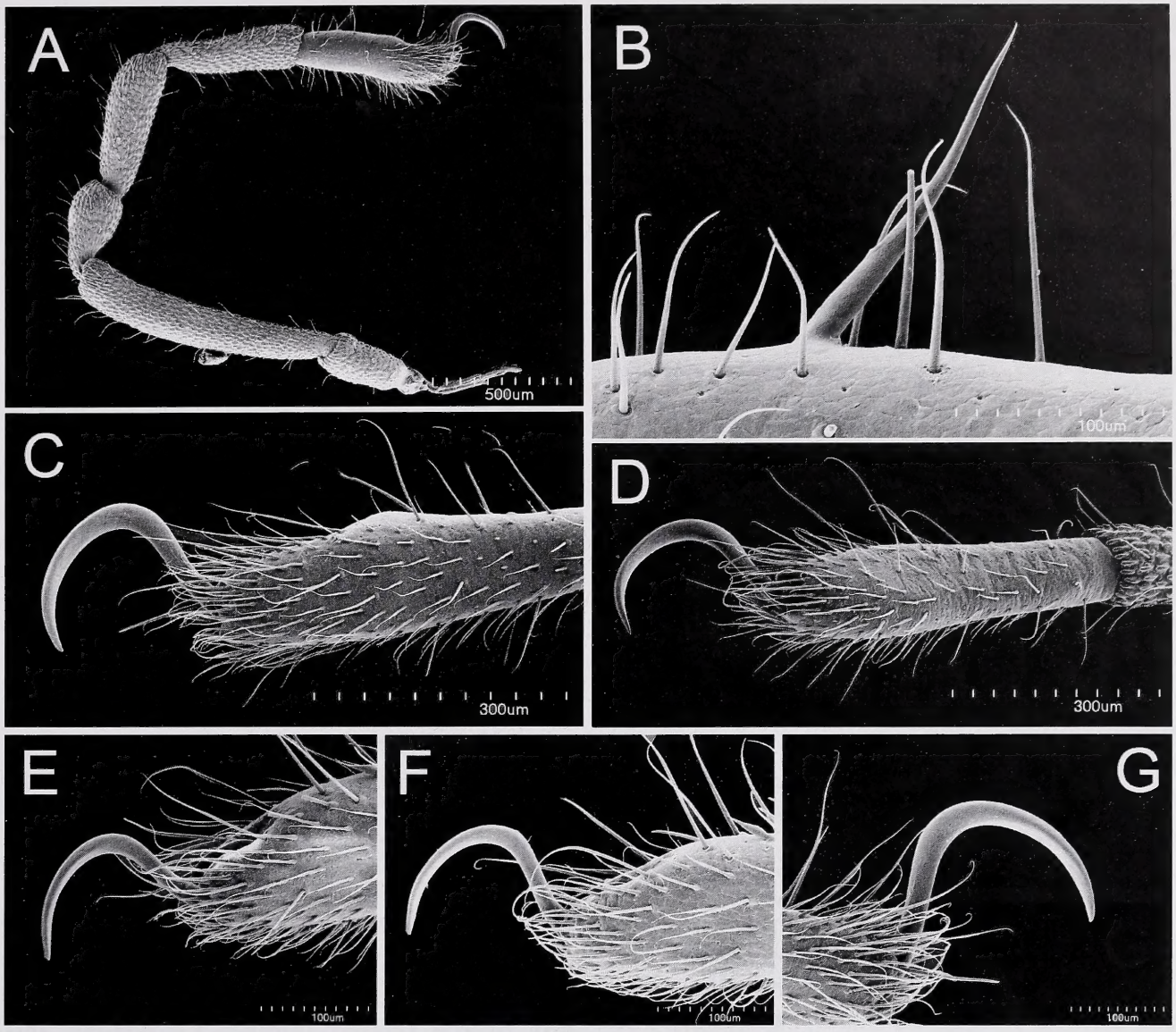

Figure 4. *Shearogovea* cf. *mexasca* from Cueva de la Finca. A, left leg IV, male; B, adenostyle; C, left leg I, male; D, left leg IV, female; E, left claw II, male; F, left claw III, male; G, left claw IV, male.

the genus (type locality: Cueva del Nacimiento del Río San Antonio). Whether the second collection from Cueva de la Finca, a nearby cave, represents the same species or not, remains unsolved, as no males are known from the type locality. These two caves are not in the same hill, but the two hills are separated at the surface by 1 km of valley fill comprised of soil and volcanic boulders, but in the subsurface the limestone is likely contiguous, as is the case of the troglobitic tarantula *Hemirrhagus reddelli* (Gertsch, 1973) and the troglobitic schizomid *Stenochrus firstmani* (Rowland, 1973) (Rowland and Reddell, 1980). However, until males from both caves or molecular data become available, I refer to the specimens from the second locality as *Shearogovea* cf. *mexasca*.

Etymology. The generic name is a combination of the last name of arachnologist and myriapodologist William Shear, to whom this genus is dedicated—in honor of his many contributions to the study of Cy-

phophthalmi, which include, among many other aspects, four genera and 30 species—and the termination -ogovea, typical of neogoveid and ogoveid species. Gender is feminine.

Remarks. The type species of the genus was originally described in the genus *Neogovea* Hinton, 1938, although in the original description Shear (1977:175) stated that "The general appearance of the animal suggests intermediacy between *Metasiro americanus* and the other species of *Neogovea*, and a new generic name may be warranted when males are discovered." In the following paper describing the males from a nearby cave, Shear (1980:17) also pointed out that "The adenostyle of *N. mexasca* is not like that of the epigean species, but more like that found in species of *Siro*. I cannot say if this represents a specialization or the retention of an ancestral form. Certainly, *N. mexasca* is far separated from the South American species and could be a very ancient relict of an original *Neogovea* stock—predating both the origin of the brushlike adenostyle and the extensive coxal fusion of the South American species."

After studying the evolution of Neogoveidae and its related families (Ogoveidae and Troglosironidae) (Giribet *et al.*, in press) we now understand that major differences exist between the Amazonian genus *Neogovea* and *Shearogovea* gen. nov. These differences are not restricted to the adenostyle, so characteristic in the genus *Neogovea* (see Jocqué and Jocqué, 2011). The free coxae II distinguishes *Shearogovea* from most neogoveid genera, although the Brazilian *Canga* DaSilva, Pinto-da-Rocha & Giribet, 2010 and the North American *Metasiro* Juberthie, 1960 also show this condition (Juberthie, 1960; DaSilva *et al.*, 2010). This character state is shared with pettalids, troglosironids, and most sironids (except for *Iberosiro* de Bivort & Giribet, 2004 and *Paramiopsalis* Juberthie, 1962), but differs from stylocellids and ogoveids, which, like most neogoveids, show fusion to the coxae of legs III (which are always fused to coxae of legs IV) (Giribet and Boyer, 2002). The lack of dentition in the claw of walking leg II and lack of any sort of opisthosomal exocrine glands, now interpreted as synapomorphies of the clade including these three families, also removes *Shearogovea* from the family Neogoveidae, as proposed by Benavides and Giribet (2007). The lack of jagged dentition in the cheliceral mobile digit and the absence of opisthosomal exocrine glands are two other character states differing from neogoveids and troglosironids.

The placement of *Shearogovea* gen. nov. in the cladistic analysis of Giribet and Boyer (2002) was rather unresolved, and under their "root 2", would have resulted in an unresolved position with *Parasiro* and a clade containing ogoveids, neogoveids, troglosironids and stylocellids. A recent analysis combining molecular data and morphology (the former not available for *Shearogovea* gen. nov.) shows again an unstable phylogenetic position of *Shearogovea* gen. nov., but it does not group with neogoveids or with any of the related families Ogoveidae and Troglosironidae (Giribet *et al.*, in press). A relationship to the Laurasian family Sironidae is, however, plausible, given the data available at the moment, which would reinforce the idea of *Shearogovea* gen. nov. being a Laurasian relict.

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